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The Design and Study of the Tehran TV Tower

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(Abstract of Architectural Dissertation)

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This dissertation investigates the design and implementation of a significant telecommunications tower in Tehran, a city facing increasingly complex urban and technological demands. The project was initiated in direct response to the ongoing broadcasting challenges encountered by the Islamic Republic of Iran Broadcasting (IRIB), particularly in Greater Tehran and the adjacent Karaj region. These issues stem from a combination of challenging topography and the proliferation of high-rise developments in the city's central and northern areas, both of which undermine the quality and reliability of TV and radio signal transmission.

Since its establishment, IRIB has consistently pursued the use of tall structures—primarily metallic masts and towers—to enhance broadcast coverage across the nation. However, these incremental solutions have proven inadequate in fully addressing signal degradation in certain key urban districts. The persistent transmission problems in Tehran's western suburbs prompted IRIB's Network Expansion Department to propose a more comprehensive and permanent strategy: the construction of a high-performance, multi-functional television tower. The envisioned structure, a 430-metre reinforced concrete tower to be located in Tehran's north-western Gisha district, was designed not only to resolve technical inefficiencies but also to serve as an architectural and urban landmark in its own right.

This dissertation explores the feasibility, design process, and architectural potential of such a tower, intending to integrate advanced telecommunications infrastructure with meaningful public functions. By examining the project through multiple lenses- engineering, architecture, environmental studies, and urbanism- the research aims to create a blueprint for a tower that is not only a broadcasting tool but a civic symbol. The proposed tower is imagined as a multifunctional vertical complex, incorporating observation platforms, cultural and recreational facilities, commercial amenities, and public gathering spaces. These programmatic elements are strategically layered to elevate the structure beyond its utilitarian origins, enabling it to serve as a cultural and touristic destination while reinforcing Tehran's metropolitan identity.

The dissertation is structured into fourteen chapters, each addressing a key aspect of the tower's design and implementation:

1. **Introduction** – Outlines the research objectives, significance of the project, and its broader national and urban implications.
2. **Literature Review** – Surveys international precedents and academic studies on telecommunications towers, high-rise construction, and urban landmarks.
3. **Methodology** – Describes the research approach, including comparative analysis, site evaluation, technical modelling, and design synthesis.
4. **Technical Equipment of the Tower** – Discusses the specific broadcasting technologies and antenna configurations required to achieve optimal signal coverage.
5. **Concrete Tower Structures** – Explores the structural systems and construction strategies suitable for very tall reinforced concrete buildings.

6. **Construction Technology** – Details innovative building techniques and logistical considerations for erecting a tower of this scale.
7. **Architecture of Concrete Towers** – Analyses the aesthetic and functional evolution of concrete tower design, with case studies.
8. **Mechanical and Electrical Systems** – Reviews the mechanical, electrical, and HVAC infrastructure necessary to support tower operations and public use.
9. **Maintenance and Repair Strategies** – Evaluates long-term sustainability, accessibility, and structural resilience.
10. **Environmental and Site Analysis** – Assesses the climatic, geological, and urban integration factors influencing the site selection and tower orientation.
11. **Results** – Presents findings from technical simulations, case study comparisons, and design development.
12. **Discussion** – Interprets the results in the context of Tehran's urban fabric and the project's potential impact on city life.
13. **Conclusion and Design Brief** – Summarises key insights and outlines the proposed design features in detail.
14. **References** – Cites academic sources, technical manuals, and project data used throughout the study.

A core component of the research involved a comparative analysis of approximately fifty television towers from around the globe, including renowned examples such as the CN Tower in Toronto, the Ostankino Tower in Moscow, the Tianjin Radio and Television Tower in China, and Berlin's Fernsehturm. These case studies were carefully examined for their structural systems, architectural form, functional diversity, public engagement strategies, and urban symbolism. By synthesising lessons from these international precedents, the dissertation formulates a design framework specific to Tehran's cultural, climatic, and technological context.

The proposed Tehran TV Tower is envisioned as a tri-functional entity. First and foremost, it acts as a telecommunications hub, hosting a full suite of signal transmission and antenna systems necessary for nationwide broadcasting. Secondly, it incorporates a variety of public and semi-public functions, including observation decks, restaurants, exhibition spaces, and conference halls. These are intended to attract both residents and tourists, establishing the tower as a point of civic pride and a key element in Tehran's skyline. Thirdly, the tower is positioned to contribute to broader urban strategies- acting as a visual axis, a connective node in transportation networks, and a generator of urban activity in its immediate surroundings.

Architecturally, the design seeks to harmonise technical rigour with expressive form. Inspired by Iran's rich architectural heritage and modern engineering possibilities, the tower's profile emerges as a dynamic interplay of verticality, rhythm, and sculptural solidity. The structure tapers as it ascends, balancing aerodynamic efficiency with a commanding visual presence. The tower base is articulated as a podium complex containing plazas, landscaped terraces, and civic amenities designed to foster public interaction and community use.

Sustainability and resilience are integral to the design ethos. The structure is conceived to meet long-term operational demands, incorporating passive cooling strategies, energy-efficient systems, and durable materials suitable for Tehran's climate. Maintenance access, structural flexibility, and seismic considerations are thoroughly integrated into the engineering plan, ensuring that the tower will remain serviceable, safe, and adaptable over time.

In conclusion, this dissertation proposes a vision for the Tehran TV Tower that transcends the limitations of conventional broadcasting infrastructure. It advocates for a high-rise architectural landmark that fulfils a vital technological need while also enhancing urban life and cultural identity. Through rigorous research, cross-disciplinary analysis, and an ambitious design proposal, the study contributes to the broader discourse on how telecommunications structures can be reimagined as multifunctional civic icons in the contemporary city.

These studies have been compiled into a comprehensive document totalling 412 pages. Included are the architectural designs for the proposed 430-metre tower, along with all relevant details, landscaping plans, and the necessary appendices.

This dissertation was completed under the supervision of Professor Mahmood Razjouyan and Professor Saeed Mashayekh Faridani at Shahid Beheshti University.